**IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE**

Appl. No. : 10/597,569
Applicant(s): Dirk Jan Broer, et al.
Filed: July 31, 2006
TC/A.U.: 2800/2871
Examiner: Lucy P. Chien
Atty. Docket: NL 040069 US1
Confirmation No.: 2999
Title: MECHANICAL STRUCTURE INCLUDING A LAYER OF POLYMERISED LIQUID CRYSTAL AND METHOD OF MANUFACTURING SUCH

APPEAL BRIEF

Honorable Assistant Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In connection with the Notice of Appeal dated **March 16, 2010**, Applicants provide the following Appeal Brief in the above-captioned application.

1. Real Party in Interest

The real party in interest as assignee of the entire right and title to the invention described in the present application is Koninklijke Philips Electronics, N.V., having a principal place of business at Groenewoudseweg, 1Eindhoven, NL 5621 BA.

2. Related Appeals and Interferences

There are no known related appeals or interferences.

3. Status of the Claims

Claims 1-8, 10-12 and 14-17 are pending in the application. Claims 9 and 13 are cancelled. Claim 17 is allowed. Claims 1-8, 10-12 and 14-16 are rejected. The rejected claims are presented in the Appendix.

4. Status of the Amendments

A Response under Rule 116 was filed on February 15, 2010, and was entered. An Advisory Action was mailed on March 9, 2010. A Notice of Appeal was filed on March 16, 2010.

5. Summary of the Claimed Subject Matter[1]

Referring to claim 1:

In accordance with a representative embodiment, a mechanical structure (See, e.g., Fig. 1) comprises a substrate (e.g., 103, Fig. 1 and 201, Fig. 2) and a layer of (e.g., 100, Fig. 1) an oriented polymerized liquid crystal forming an element on the substrate (e.g., 103). The element is locally adhered to an adhering region (e.g., 203, 204, Fig. 2) of the substrate and is delaminated from the substrate at a non-adhering region of said substrate. The adhering region has a higher adhesiveness to the polymerized liquid

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1 In the description to follow, citations to various reference numerals, drawings and corresponding text in the specification are provided solely to comply with Patent Office Rules. It is emphasized that these reference numerals, drawings and text are representative in nature, and in not any way limiting of the true scope of the claims. It would therefore be improper to import any meaning into any of the claims simply on the basis of illustrative language that is provided here only under obligation to satisfy Patent Office rules for maintaining an Appeal.

crystal than the non-adhering region. The oriented polymerized liquid crystal of the layer has an anisotropic orientation such as to render the element moveable by non-mechanical means between a first state having a first shape and a second state having a second shape different from the first. (Please refer to claim 1; Figs. 1 and 2; and page 8, line 30 through page 11, line 30 of the filed application for additional details.)

Referring to claim 10:

In accordance with another representative embodiment, a method of manufacturing a mechanical structure comprising a substrate (e.g., 103, Fig. 1 and 201, Fig. 2) and a layer (e.g., 100, Fig. 1) of an oriented polymerized liquid crystal forming an element on the substrate is disclosed. The oriented polymerized liquid crystal of the layer has an anisotropic orientation such as to render the element moveable by non-mechanical means between a first state having a first shape and a second state having a second shape different from the first. The method comprises: providing a substrate (e.g., 201) that has a patterned surface comprising an adhering region and a non-adhering region (e.g., 203, 204, Fig. 2). The adhering region has a higher adhesiveness to the polymerized liquid crystal than said non-adhering region. The method also comprises applying a layer of polymerizable liquid crystal (e.g., 205, Fig. 2) on the patterned surface; orienting the polymerizable liquid crystal in said layer; polymerizing said oriented polymerizable liquid crystal to provide a layer of oriented polymerized liquid crystal which layer adheres well to the adhering region and less well to the non-adhering region (See steps 3-5 in Fig. 2). The method comprises delaminating said layer of oriented polymerized liquid crystal mixture from the substrate at the said non-adhering region (See step 6, Fig. 2). (Please refer to claim 2; Figs. 1 and 2; and page 8, line 30 through page 11, line 30 of the filed application for additional details.)

6. Grounds of Rejection to be Reviewed on Appeal

The grounds of rejection to be reviewed on appeal are:

I. The rejection of claims 1,2,4,6,8,10 and 14-16 under 35 U.S.C. § 102(b) as allegedly being anticipated by *Harvey, et al.*;

II. The rejection of claims 3 and 7 under 35 U.S.C. § 103(a) as allegedly being obvious in view of *Harvey, et al.* and *Eich, et al.*

III. The rejection of claims 5 and 12 under 35 U.S.C. § 103(a) as allegedly being obvious in view of *Harvey, et al.* and *Voldman, et al.*

7. Argument

I. Rejections under 35 U.S.C. § 102(b) in view of *Harvey, et al.*

At the outset, Applicants rely at least on the following standards with regard to proper rejections under 35 U.S.C. § 102. Notably, a proper rejection of a claim under 35 U.S.C. § 102 requires that a single prior art reference disclose each element of the claim. *See, e.g., W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983). Anticipation requires that each and every element of the claimed invention be disclosed in a single prior art reference. *See, e.g., In re Paulsen,* 30 F.3d 1475, 31 USPQ2d 1671 (Fed. Cir. 1994); *In re Spada*, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Cir. 1990). Alternatively, anticipation requires that each and every element of the claimed invention be embodied in a single prior art device or practice. *See, e.g., Minnesota Min. & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.,* 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992). For anticipation, there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. *See, e.g., Scripps Clinic & Res. Found. v. Genentech, Inc.,* 927 F.2d 1565, 18 USPQ2d 1001 (Fed. Cir. 1991).

i. Claim 1

Claim 1 recites:

A mechanical structure comprising a substrate and a layer of an oriented polymerized liquid crystal forming ***an element*** *on said substrate,*

wherein said element is locally adhered to an adhering region of said substrate and is delaminated from said substrate at a non-adhering region of said substrate, where said adhering region has a higher adhesiveness to the polymerized liquid crystal than said non-adhering region; and

wherein the ***oriented polymerized liquid crystal of said layer has an anisotropic orientation such as to render the element moveable by non-mechanical means*** *between a first state having a* ***first shape*** *and a second state having a* ***second shape*** *different from the first.*

In rejecting claim 1, the Office Action directs Applicants to column 3, lines 10-15 and lines 33-50 of *Harvey, et al.* The portions relied upon relate to fabrication of liquid crystal polymer films and the problems associated with curling due to the fibrillar nature of the polymer. There is no description of rendering liquid polymers movable between first and second states, and especially by non-mechanical means. To this end, the heating of the sheets at column 2, line 64-column 3, line 10 describe the heating and cooling of the sheets and the curling that results due to different coefficients of thermal expansion of surface layers of the sheets. Moreover, annular discs are used to establish biaxial and multiaxial orientation of molecules. As set forth at column 3, and as noted in the response under Rule 111, *Harvey, et al.* discloses at column 3, lines 30-41:

"But, as mentioned above, such a **process forms two layers in the film with complementary orientations, for example +/-45°, on either side of the machine direction in which the extrusion has taken place. As described above, this has led to the drawback of curling in liquid crystal polymer film sheets made from such extruded tubes.** The liquid crystal polymer films become less anisotropic due to the application of transverse shear, but they still curl after cooling, because of the non-uniform CTE phenomenon mentioned above. Curl becomes very significant when the film is orthotropic, i.e., having equal properties in orthogonal directions in the plane of the film, as in a balanced biaxial film." (Emphasis added.)

Thus, while *Harvey, et al.* discloses the fabrication of two layers with complementary orientations, this is described by the reference as leading to an undesired curling of the liquid crystal polymer, and specifically does not describe **rendering**

anything ***moveable by non-mechanical means*** *between a first state having a* ***first shape*** *and a second state having a* **second shape** *different from the first*; and especially a *layer of an oriented polymerized liquid crystal* forming **the element** on the substrate. Stated somewhat differently, the portion of *Harvey, et al.* to which Applicants are directed for the alleged disclosure of the noted features of claim 1 describe forming layers in a film with complementary orientations; there is no disclosure of rendering an element moveable by non-mechanical means between first and second states having different shapes.

In reply to the "Response to Arguments" set forth on page 2, Applicants respectfully submit that nowhere in column 3 of *Harvey, et al.* is there a description of application of a voltage resulting in the movement of an element between first and second states of first and second shapes. Therefore, Applicants respectfully demur.

In reply to the Advisory Action, Applicants have reviewed the Abstract of *Harvey, et al.* and respectfully submit that while a controlled molecular orientation liquid crystal is disclosed, the Abstract does not cure the deficiencies of *Harvey, et al.* discussed above. To this end, the Abstract in its entirety recites:

"A flat and nearly mechanically isotropic polymer film or sheet, or a tube, can be formed by laminating two or more films, preferably by coextrusion of a liquid crystal polymer film and a thermoplastic polymer film. A liquid crystal polymer layer may be combined with one or more thermoplastic polymer layer in various arrangements. The liquid crystal, and possibly the thermoplastic as well, may have a controlled molecular orientation. The film may also be formed by passing a polymer through a set of two or three tubular rotors which are concentric and have facing surfaces which define inner and outer annular polymer flow channels."

Accordingly, and for at least the reasons set forth above, Applicants respectfully submit that the applied art fails to disclose at least one feature of claim 1. Therefore, a *prima facie* case of anticipation cannot be made in view of *Harvey, et al.*, and claim 1 is patentable thereover. Furthermore, claims 2 and 4-8, which depend from claim 1, are patentable for at least the same reasons and in view of their additionally recited subject matter.

ii. Claim 10

Claim 10 features, inter alia:

"A method of manufacturing a mechanical structure comprising a substrate and a layer of an oriented polymerized liquid crystal forming an element on said substrate, wherein ***the oriented polymerized liquid crystal of said layer has an anisotropic orientation*** *such as to render the element* ***moveable by non-mechanical means*** *between* ***a first state*** *having a first shape and* ***a second state*** *having a second shape different from the first, said method comprising..."*

The rejection of claim 10 relies on the same portion of *Harvey, et al.* that was relied upon in the rejection of claim 1. Therefore, and for at least the reasons set forth above, Applicants respectfully submit that the applied art fails to disclose at least one feature of claim 10. Therefore, a *prima facie* case of anticipation cannot be made in view of *Harvey, et al.*, and claim 10 is patentable thereover. Furthermore, claims 11, 12 and 14-16, which depend from claim 10, are patentable for at least the same reasons and in view of their additionally recited subject matter.

II. The rejection of claims 3 and 7 under 35 U.S.C. § 103(a) in view of *Harvey, et al.* and *Eich, et al.*

The rejections of claims 3 and 7 under this section of the Code have been considered. While Applicants in no way concede the propriety of the rejections, claims 3 and 7 depend from claim 1. As such, claims 3 and 7 are patentable for at least the same reasons and in view of their additionally recited subject matter.

III. The rejection of claims 5 and 12 under 35 U.S.C. § 103(a) in view of *Harvey, et al.* and *Voldman, et al.*

The rejections of claims 5 and 12 under this section of the Code have been considered. While Applicants in no way concede the propriety of the rejections, claims 5 and 12 depend from one of claims 1 and 10. As such, claims 5 and 12 are patentable for at least the same reasons and in view of their additionally recited subject matter.

Conclusion

In view the foregoing, applicant(s) respectfully request(s) that the Examiner withdraw the objection(s) and/or rejection(s) of record, allow all the pending claims, and find the application in condition for allowance.

If any points remain in issue that may best be resolved through a personal or telephonic interview, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

Respectfully submitted on behalf of:
Philips Electronics North America Corp.

_/William S. Francos/____________________
by: William S. Francos (Reg. No. 38,456)
Date: May 17, 2010

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APPENDIX

Claims on Appeal

1. A mechanical structure comprising a substrate and a layer of an oriented polymerized liquid crystal forming an element on said substrate,

wherein said element is locally adhered to an adhering region of said substrate and is delaminated from said substrate at a non-adhering region of said substrate, where said adhering region has a higher adhesiveness to the polymerized liquid crystal than said non-adhering region; and

wherein the oriented polymerized liquid crystal of said layer has an anisotropic orientation such as to render the element moveable by non-mechanical means between a first state having a first shape and a second state having a second shape different from the first.

2. A mechanical structure according to claim 1, wherein said non-mechanical means include a variation in temperature.

3. A mechanical structure according to claim 1, wherein said non-mechanical means include exposure to electromagnetic radiation of different wavelengths.

4. A mechanical structure according to claim 2, wherein the substrate includes an orientation layer a surface of which comprises at least said non-adhering region.

5. A mechanical structure according to claim 1 wherein said non-adhering region is formed of an apolar polyimide surface and said adhering region is formed of a polar polyimide surface obtainable by oxidizing an apolar polyimide surface.

6. A mechanical structure according to claim 1 wherein, at the adhering region, the polymerized liquid crystal is covalently bonded to the substrate.

7. A mechanical structure according to claim 5, wherein said non-mechanical means include a control electrode provided on said element and a ground electrode provided on

said substrate, such that said element is moveable between said first and second state by means of electrostatic forces set up between said control and ground electrode.

8. A mechanical structure as claimed in claim 1 wherein the polymerized liquid crystal has a twisted nematic orientation.

10. A method of manufacturing a mechanical structure comprising a substrate and a layer of an oriented polymerized liquid crystal forming an element on said substrate, wherein the oriented polymerized liquid crystal of said layer has an anisotropic orientation such as to render the element moveable by non-mechanical means between a first state having a first shape and a second state having a second shape different from the first, said method comprising:

providing a substrate that has a patterned surface comprising an adhering region and a non-adhering region, wherein said adhering region has a higher adhesiveness to the polymerized liquid crystal than said non-adhering region;

applying a layer of polymerizable liquid crystal on said patterned surface;

orienting the polymerizable liquid crystal in said layer;

polymerizing said oriented polymerizable liquid crystal to provide a layer of oriented polymerized liquid crystal which layer adheres well to the adhering region and less well to the non-adhering region; and

delaminating said layer of oriented polymerized liquid crystal mixture from the substrate at the said non-adhering region.

11. A method according to claim 10, wherein the step of providing a substrate that has a patterned surface includes providing selectively at the adhering region an orientation layer including chemical groups which are capable of reacting with the polymerizable liquid crystal mixture, such as an oriented polyimide layer including acrylate groups.

12. A method according to claim 10, wherein the step of providing a substrate that has a

patterned surface includes providing selectively at said non-adhering region an orientation layer including inhibiting groups which inhibit polymerization of the polymerizable liquid crystal mixture adjacent said non-adhering region.

14. A method according to claim 10, wherein said step of polymerizing said polymerizable liquid crystal includes the step of bringing, on the side facing away from the substrate, the polymerizable liquid crystal into contact with an orientation layer to provide the polymerizable liquid crystal at that side with an orientation which is different from the orientation induced in the polymerizable liquid crystal adjacent the substrate.

15. A method according to claim 14, wherein the orientation layer provided on the side facing away from the substrate has a surface functionalized with surfactants providing the polymerizable liquid crystal adjacent said orientation layer with a homeotropic orientation.

16. A method according to claim 10, wherein said polymerizable liquid crystal comprises a monomer that has a polar end and an apolar end rendering the monomer capable of inducing a homeotropic orientation at a surface of the layer of polymerizable liquid crystal which is in contact with air.

APPENDIX

Evidence

APPENDIX

Related Proceedings